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Further History of the Case of Paralysis of the Posterior Crico-Arytenoid Muscles presented at the First Meeting of the Association in 1879. With Report of Autopsy and Exhibition of Specimen and Microscopic Preparations.

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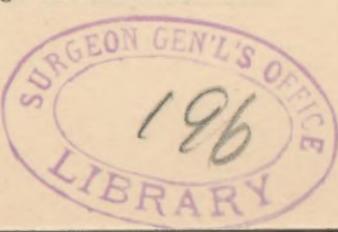
By J. SOLIS-COHEN, M. D.,
PHILADELPHIA.

As the history of the case was given when the patient was exhibited before the association seven years ago, it is unnecessary to repeat it in detail. To quote from the second edition of my book on "Diseases of the Throat," 1879, p. 654.

"In October, 1876, a gentleman, forty-six years of age, of good physique and in apparent health, had suffered for two years or more with cough, dyspnœa, and occasional obstruction, and alarming spasm of the larynx, which had eventuated in loss of consciousness in the street on two occasions. His respiration was labored, inefficient, and attended with such inspiratory stridor in sleep that it could be heard all over his residence. Early in life he had a suppurative inflammation of his left ear, which had

* Read before the American Laryngological Association.

presented by the author.



eventually subsided. He had been addicted to excessive smoking (fifteen or sixteen cigars a day, and an occasional pipe or two in addition) for many years. Hearing was somewhat impaired. Laryngoscopic inspection revealed paralysis of the posterior crico-arytenoid muscle of the left side, with a tendency to spasm of the glottis, as provoked by the examination. Interrogation revealed the fact that irritation of the left external auditory meatus always induced cough, followed by spasm of the larynx, so that the patient dared not cleanse the ear for fear of exciting a paroxysm. A tentative treatment was instituted, with the addition of a constant supply of nitrite of amyl at hand for inhalation on the occurrence of a spasm. All went well for a few days, when an inadvertent manipulation of the ear brought on a terrific spasm that was reported as well nigh fatal. Recounting this to me next day, while awaiting his attending physician, Dr. Hinkle, in my reception-room, he placed his finger in his ear to illustrate the occurrence, when a severe paroxysm of spasm was provoked just as Dr. Hinkle entered the room, in time to assist me in controlling it by the prompt administration of vapor of chloroform. On the following day I performed tracheotomy, and the patient has been wearing a tube for more than two years (1878). After the operation the patient's hearing improved and remained improved. Color-blindness, however (chiefly interchange of red and green), soon supervened, and ophthalmoscopic inspection revealed progressive atrophy of the optic nerves, which has since increased to very indistinct vision. The tendency to cough and to spasm on titillation of the ear continues, but no lesion is apparent on inspection. Within a few weeks after the operation the right vocal cord became paralyzed likewise, and at the end of about three months the paralysis became so complete, and the tension of the vocal cords and ary-epiglottic folds so marked, that it is difficult to believe that there is not in addition permanent spasm of the arytenoid and lateral crico-arytenoid muscles; for from that time to the present (1878), now more than two years, I have never seen the glottis in any other condition, although there is sometimes just enough separation of the arytenoid cartilages on forcible inspiration to see that they are not welded together;

otherwise the condition simulates adhesion of the arytenoid cartilages, as I have seen it in stenosis after syphilis."

During the next four years I saw this patient at various irregular intervals. His larynx always presented the same picture of apparent tonic spasm of the constrictor muscles. Irritation of his ear always produced spasmodic cough. The only special complaint he made was of intense cold in his testicles, as though ice were continuously at the posterior part of his scrotum. He became completely blind. His hearing continued good. His voice remained powerful; he could speak loudly without occluding the orifice of his tube. I did not see him during the last four years of his life. In the early portion of the present year the physician in attendance at his home in another State sent to me for a special tube that I had used shortly after the tracheotomy, as the tubes worn for so many years were giving trouble, by irritating the trachea, probably on account of progressive emaciation in the tissues of the neck. I learned that the patient was gradually sinking by asthenia. He died, and I was offered a long-promised autopsy. Professor Forbes, of the anatomical chair of Jefferson Medical College, was kind enough to accompany me and to make the dissection. With great skill he removed in one continuous mass all the structures involved in the question as to the origin of the laryngeal lesion—external auditory meatus, middle ear, Eustachian tube, palate, pharynx, œsophagus, trachea, and adjacent portion of lungs, aortic arch, heart, recurrent nerves, pneumogastric, cervical cord, medulla, and brain.

After the autopsy I learned from the family that for four years—that is, since my last interview—the patient had had difficulty in walking; that for the last nine months of his life his feet slipped apart when he tried to hold anything in his lap, and that he would strap his legs together before

placing upon them the tray from which he fed; that for five months he had been compelled to get into bed on the right side, and then lift his left leg into the bed. He sat with his right leg crossed over the left. The right leg was emaciated and apparently much shortened: probably from being drawn upward upon the pelvis. For eighteen months he had been in the habit of having the calves of his legs tied and strapped together as tightly as possible to relieve pain, and sometimes had his arms bound up to relieve a sense of cold. Numbness of the hands and of the face existed for the last twelve months. For the last two weeks his eyeballs had become fixed. For the last three weeks he had complained of heat, although he had always complained of cold previously. His voice remained very powerful to the last. Toward the last years of his life, I was told, his spasms had subsided entirely, and his cough had almost entirely ceased also. His appetite had remained enormous throughout.

During the autopsy we noticed nothing that threw special light on the case. The general emaciation was extreme—so great that it was hard to recognize the body of my very robust patient. The right leg was much shorter than its fellow. The nares, turbinate bodies, pharynx, palate, and other structures exposed were normal, except two points of erosion in the trachea from attrition by the tube. These occupied portions of the seventh and eighth cartilages. The lungs were healthy, and so were the pleura and the bronchi. There were a very few pleural adhesions. Two darkly pigmented bronchial glands, of the size of small beans, were adherent where the left recurrent nerve diverged from the pneumogastric.

The specimens were immediately carried to Professor Osler, who carefully dissected them, and examined them macroscopically for me that night, placing selected portions

of the structures, with the assistance of Dr. Griffith, in preservative fluid for microscopic purposes.

The result of the examination, communicated by Dr. Osler and Dr. Griffith, is as follows :

Heart.—Of medium size; left ventricle firmly contracted; mitral valve normal; left auricle contains a small clot adherent to the valve; wall somewhat hypertrophied; aortic valve normal. Right auricle contains firm leathery clots adherent to valves; valves of right side normal; tricuspid orifice a little large. Aorta a little large; atheromatous patches on the posterior aspect. Left pneumogastric, as it passes over the arch, looks natural. No adhesions. At point of origin of recurrent laryngeal are two pigmented lymphatic glands, closely adherent to the cardiac and pulmonary branches. Traced in its source upon the windpipe, there is no compression. The nerve has a grayish-white natural appearance. The right recurrent is unobstructed in its course.

Brain.—Cerebrum removed. Base: vessels of circle natural in appearance. A few flakes of atheroma on the carotid, Sylvian, and basilar arteries. Olfactory nerves normal in size and in appearance. No lymph, no exudation, no matting about the membranes. Optic nerve and commissure grayish-white, small, and atrophic; the tract scarcely visible. Corpora albicantia natural. Third nerve represented by a small grayish-white thread.

The crura were then cut close to the pons. Pineal gland large.

Third ventricle: Commissures normal. Velum large.

Right hemisphere: General surface of the pia normal in appearance; vessels not overfilled; no special turbidity; no adhesions; convolutions full; sulci natural; no edema of the membranes. Sections of the hemisphere transversely show no focal lesions or degenerations anywhere. No excessive amount of fluid in the ventricles.

Left hemisphere: Convolutions and membranes look natural. No adhesions. On slicing, a small triangular cavity, about two

by four millimetres in extent, is found in the outer section of the lenticular nucleus.

Medulla, pons, and cerebellum: These were removed together. Vertebral and basilar arteries normal; pons symmetrical; sixth pair of nerves grayish, and look quite atrophic; twelfth pair, opaque, white; fifth pair, small, grayish, evidently much wasted; seventh and eighth pairs, opaque, white, full in size, look natural; ninth pair, fibers distinct, clear, grayish white, apparently not atrophic; on the right side they look somewhat larger and more abundant than on the left. Eleventh pair, opaque, white, apparently of normal size.

Anterior pyramids: No obvious change apparent. At its lower part, the right is decidedly smaller than the left. Right olfactory body markedly smaller in size than the left; it has lost its fullness, not standing out with anything like the prominence of the left. Arachnoid on the posterior aspect of the medulla is thin and clear. Fourth ventricle exposed: Pia mater a little adherent and thickened beneath the cerebellum. In the lower aspect of the floor, just in front of the calamus, there appears to be a grayish translucency, with two distinct conical or linear depressions just within the restiform bodies. The root-fibers of the seventh are distinct, more so on the right than on the left side. The left restiform body does not look so full in its upper part as the right does.

Microscopic Examination.—Sections were made from both recurrent nerves shortly after their departure from the pneumogastrics. Also from several portions of the pneumogastrics, including the vago-accessory nucleus, within one fourth of an inch of the calamus, from various parts of the medulla, and from the cervical cord a short distance below the calamus. All these were stained after the method of Weigert, so admirably adapted to the revealing of any degeneration of nervous tissue. No pathological change whatever was discovered in the medulla. The olfactory bodies were microscopically alike on the two sides. No pathological change was discovered in the left pneumogastric or in the left recurrent. In the right pneumogastric, on the other hand, a diminution in the number of nerve fibrils was evident. In the right recurrent, near to the point where it leaves

the pneumogastric, this degeneration of nerve fibrils was very marked. Certain sections from this portion showed some of the funiculi to be of perfectly healthy appearance, and others adjoining them to be completely degenerated. Other sections, made slightly higher in the course of the nerve, revealed one half of a large funiculus to be entirely normal, while the other half contained scarcely a single fibril in which degeneration had not taken place. The line of demarkation between the normal and the affected portions was very sharply defined. The cervical cord, with the exception of the postero-median columns, was unaffected. The regions referred to exhibited some slight degeneration of axis cylinders with thickening of connective tissue.

The Larynx.—The posterior crico-arytenoid muscles of both sides were wasted to a certain extent. That of the left side, especially, showed a degeneration of many of the muscular fibers, with a decrease in their numbers, and an increase in the amount of fibrous tissue of the parts. The oblique fibers of the arytenoideus going from the base of the left cartilage to the tip of the right were also wasted. The remaining muscles were apparently normal.

The larynx herewith exhibited shows the muscular atrophies just mentioned. It will be noticed, likewise, that the vocal bands are not in the cadaveric position, but that they are in the position of phonation—fixed in the middle line. The edges of the central portions of the bands are slightly bowed, owing to the manipulations to which they have been subjected since their removal from the body; but they are in sufficiently close contact to verify the picture published in my book several years ago. There is also some erosion of tracheal mucous membrane, with absorption of the central portion of the seventh and eighth rings from attrition by the tube, which became too long as the patient underwent emaciation toward the last, necessitating a change in the length of the cannula.

Several of the microscopic sections are under the instru-

ments now upon the table. They comprise sections from the medulla just below the calamus; within one fourth of an inch above the calamus; within one half inch above; and at the middle of the valve of Vieuussens.

It will be seen that there are no vascular changes, and no essential changes to be noted in the ganglionic cells or in the nerve fibers other than intense pigmentation. There are several sections, also, from the two pneumogastrics and from the two recurrents. Although the neurotic lesion was manifested first on the left side, the recurrent of that side is seen to be intact. In the sections through the right recurrent, at about one inch beyond its point of separation from the pneumogastric, it will be seen that fully one half of the nerve fibers have failed to take the haematoxylin stain. In the atrophic region there are from forty to fifty fibers which retain the medulla, and are stained.

The hope, long entertained, that careful examination of this case after death would cast some important light on the pathology of this class of laryngeal neuroses, has not been realized. The disease is evidently central in origin. The nature of the initial lesion producing the degeneration has not been revealed. Sufficient has been shown to prove that the vocal bands can remain in a condition of tonic spasm for a long series of years, and retain that position after death. It is a remarkable circumstance that the left recurrent should be apparently intact, while degeneration should be so marked in the right nerve, which became involved so much later. I may mention that I made inquiry as to whether a mistake might not have been made between the two recurrents, and was assured that no such mistake could have been made. Then, too, the atrophic condition of one set of the oblique fibers of the arytenoideus without participation by any other portion of the constrictor group of muscles is unexpected. The histological pathology of

the spinal lesion, so far as our examination went, is that of a case of ascending sclerosis; yet the laryngeal manifestations preceded the others by several years. I greatly regret that I did not have the opportunity for clinical study of the interesting developments of the last years, for the history gathered from the family does not warrant a diagnosis. It is also to be regretted that the entire spinal cord was not removed for study as well as some of the muscles of the extremities. The slight degeneration of the columns of Goll I presume to be secondary, though the absence of clinical studies of this condition as a primary system lesion leaves the question, like too many others in this interesting case, an open one. No lesion of the cortex was discovered, no lesion of the local laryngeal center in the medulla, no lesion pointing to an involvement of any portion of the respiratory centers. The only cerebral condition discovered that may have been connected with the laryngeal symptoms is the small cavity in the lenticular nucleus. I regret that I have no diagram of its site, nor more exact description to offer. If this denotes an interruption in the course of what has been called the "hypothetical cortico-medullar tract" of laryngeal motion, it may have a bearing upon the solution of the case. Other points upon which our examination is incomplete suggest themselves, but it is useless to recapitulate them. Much to my disappointment, I can only lay the facts before you, for even negative facts are of value, and defer theory or explanation to a time when more positive evidence shall be available. So far as the aetiology is concerned, I always suspected syphilis, though I have no evidence of that infection to proffer.

DISCUSSION.

Dr. F. H. HOOPER.—I would like to ask if the blood-vessels in the neighborhood of the recurrent nerves were examined. This is very important. Dr. Robinson, of Durham University,

England, in his prize essay on "Endemic Goftre," speaks of the vascular origin of abductor paralysis. He points out that the posterior crico-arytenoid muscles are supplied by the inferior laryngeal artery alone, and degeneration of these muscles may result from interference with their blood-supply. In a recent paper by Bäumler on "Laryngeal Paralysis in Chronic Lung Affections," the autopsy of one case showed that the arteries near the diseased recurrent nerve were markedly changed, the tunica adventitia being thickened in all, and the media in some, but the most marked change was in the intima, which at some places was so thickened as almost to cause obliteration of the vessels. There was chronic indurative neuritis in this case, which was the result either of inflamed bronchial glands or of inflammation derived from nutrient blood-vessels.

Dr. COHEN.—Dr. Osler informs me that the small vessels of the recurrents exhibit slight hyaline degeneration; not more than was to be expected, and not sufficient to be of importance. The larger vessels were not examined.



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